



Fabric Structures Team Overview

Shelter Technology, Engineering, Fabrication Directorate



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

**Jean Hampel
Team Leader**

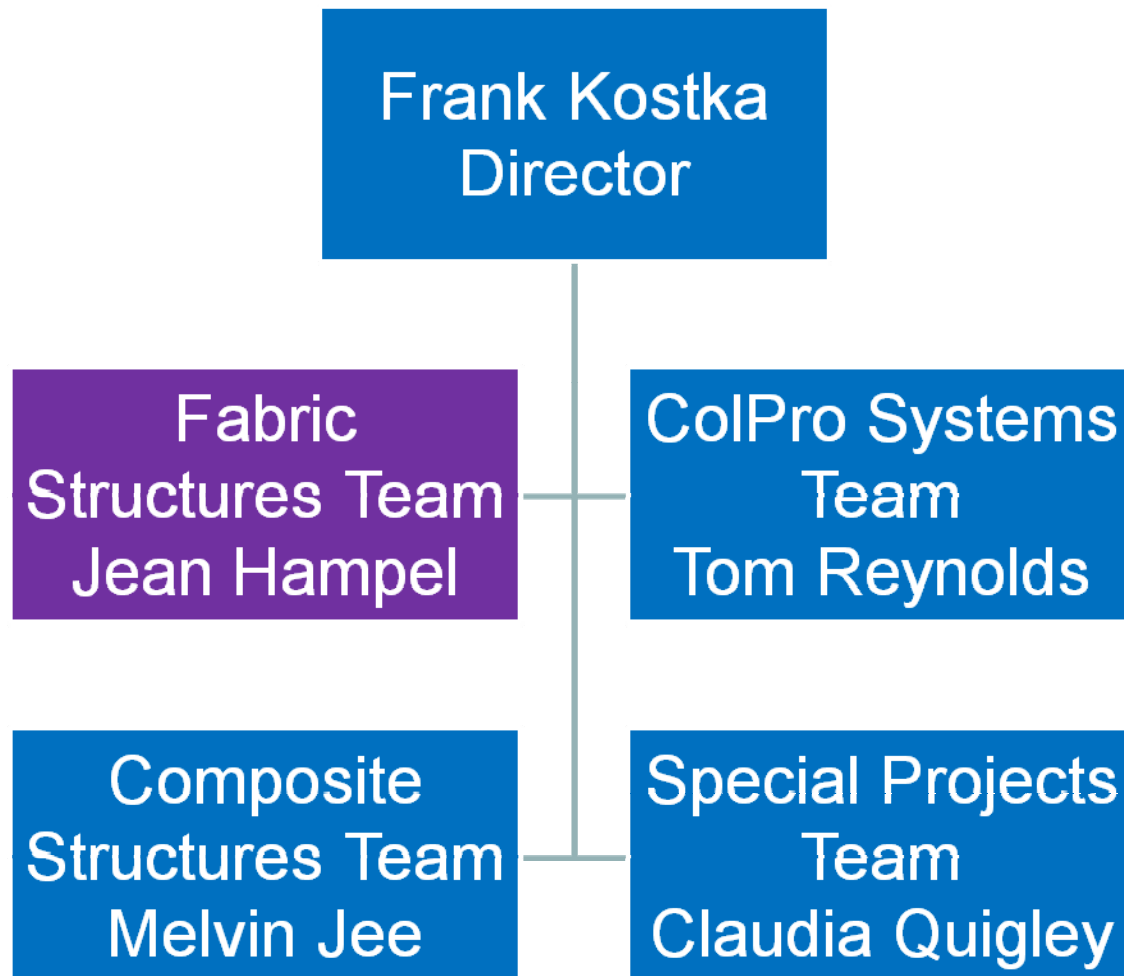
November 2009

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Shelter Technology, Engineering and Fabrication Directorate





Fabric Structures Team Personnel



- **Jean Hampel - Team Leader, Mechanical Engineer**
- **Stephanie Enos - Admin support**
- **Tom Larkham - Equipment Specialist**
- **Kristian Donahue - Chemical Engineer**
- **Robin Szczuka – Chemical Engineer**
- **Julia McAdams – Chemical Engineer**
- **Liz Swisher – Electrical Engineer**
- **Chris Aall – Mechanical Engineer**
- **Clinton McAdams – Mechanical Engineer**



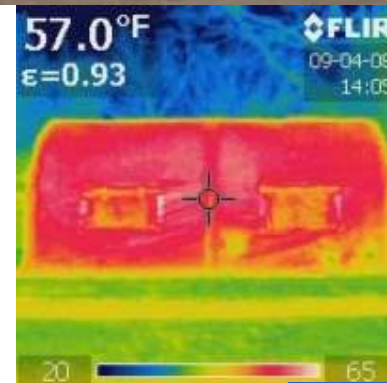
Fabric Structures Team



- **100% Customer Funded**
- **No Shelter S&T Funding Line**
- **Funding Sources**
 - **Joint Science & Technology Office, Defense Threat Reduction Agency**
 - **Joint PM-Collective Protection, JPEO-Chem Bio Defense**
 - **Army Medical Department**
 - **Defense Logistics Agency**
 - **Congressionals**
 - **SBIRs**

• Shelter Technologies:

- Airbeam Shelters:
 - Maintenance Shelters
 - Mobile Warehouses
 - Large Command Posts
 - CB Medical
 - Backpackable
- Insulation & energy
 - Aerogel insulation
 - Cellular insulation
 - Radiant Floor Heating



• Collective Protection – CB Defense:

- CB Hangars/Decon Shelters
- Reactive Airlocks
- Self-Decontaminating Fabrics
- Battlefield Contaminants Test Methods
- Family of Col Pro Shelters
- Col Pro for Military Working Dogs



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- Provides Rapid, Lightweight, Durable Deployment
- Technology transitioned to Force Provider (HDT-Vertigo, Inc.) and Chemically and Biologically Protected Shelter (Federal Fabrics-Fibers, Inc.)
- New congressional program for airbeam backpackable shelters



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2nd Generation Aviation Maintenance Shelter Demonstrated in July 09



- Designed and fabricated by Hunter Defense Technologies/Vertigo Shelters (prime), Johnson Outdoors (subcontractor)
- Congressionally Directed Effort
- FST POC: Liz Swisher

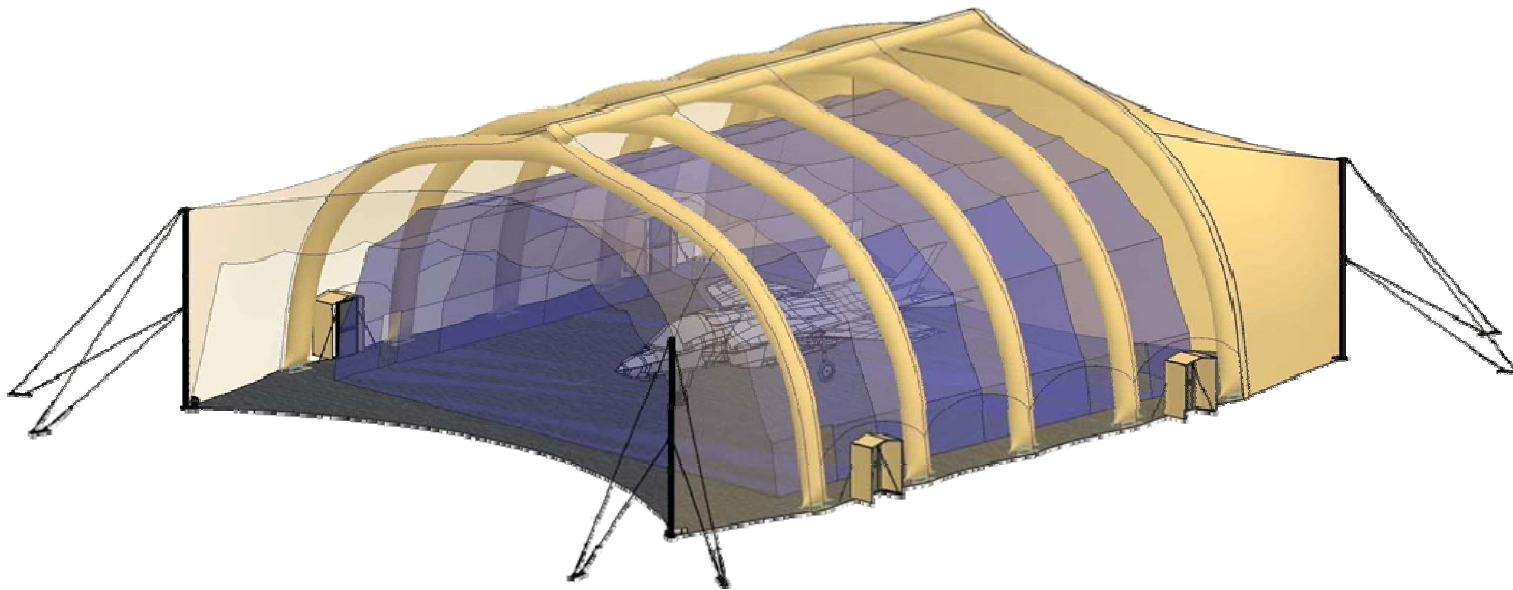
Interior Dimensions

Floor Space	83 ft × 147 ft
Area	10,600 sq ft
Height	34 ft
System Weight	18,500 lb
Pack Dimensions	Two 20-foot ISO
Number of AirBeams	7
AirBeam Working Pressure	60 psi
Snow Load	20 psf
Wind Load	
Steady	90 mph
Gust	110 mph
Set-up Time	
Under Canopy	16 hr
Full Operational Capability	24 hr
Set-up Personnel	8



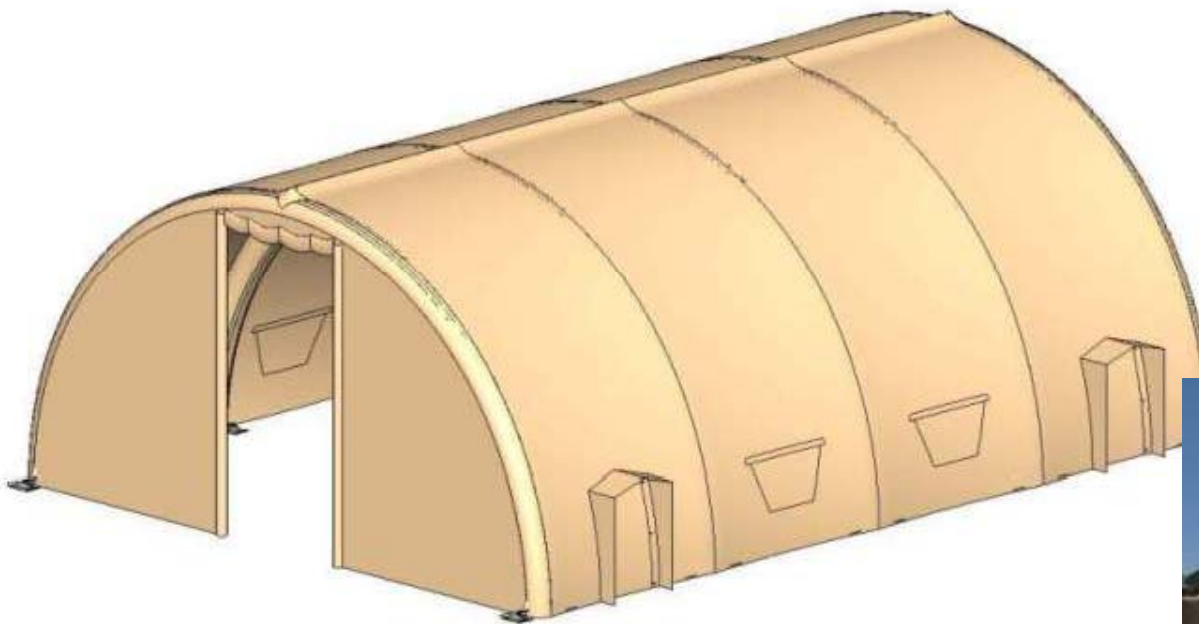
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- 5-airbeam version of 2nd generation Aviation Maintenance Shelter transitioning to Joint Strike Fighter Decon Shelter Program under Joint Program Manager – Collective Protection
- Production Products developing technology for CB liner under congressional program



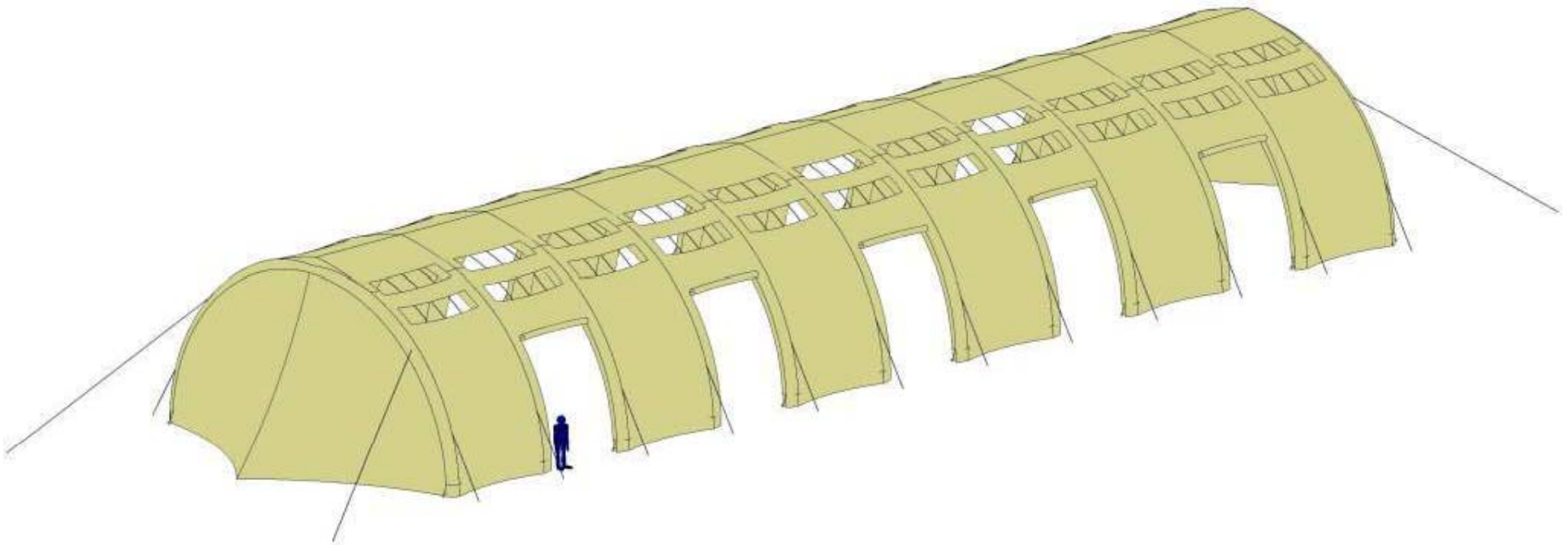
- FST POCs:
 - Tom Larkham
 - Robin Szczuka
 - Liz Swisher

- 44 ft (w) × 58 ft (l) × 23 ft (h) Five AirBeam SuperSTAT
- Prototype demo'd first time here at JOCOTAS, HDT-Vertigo, Inc. area



- FST POC: Liz Swisher

- 44 ft (w) × 143 ft (l) × 23 ft (h) Twelve AirBeam SuperSTAT
- Currently under development for Defense Logistics Agency
- FST POC: Liz Swisher





- **Fit, form and function study on CB liner for field hospital**

- **Affect of CB agents on airbeams**

- **Advanced insulation – aerogel, cellular honeycomb**



Next Generation Backpackable Tents

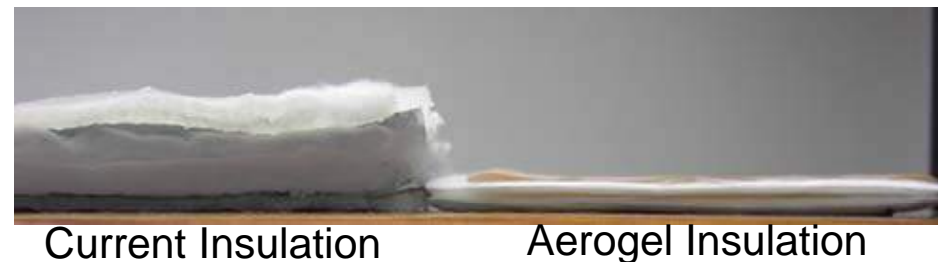
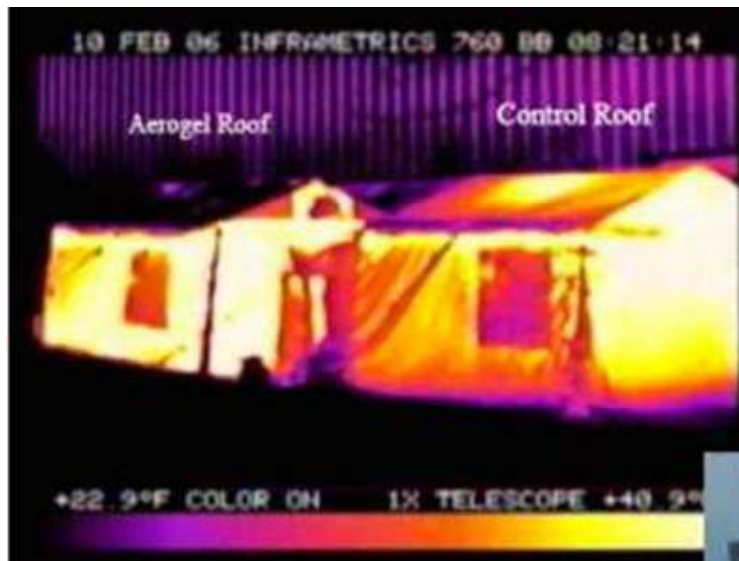
- Primary Objective - high performance backpackable tents with reduced weight and cube
- Congressionally directed program with Nemo, Inc., Nashua, NH
- Designs include novel inflatable airbeam technology and tensioned fabric/pole configurations
- FST POC: Chris Aall



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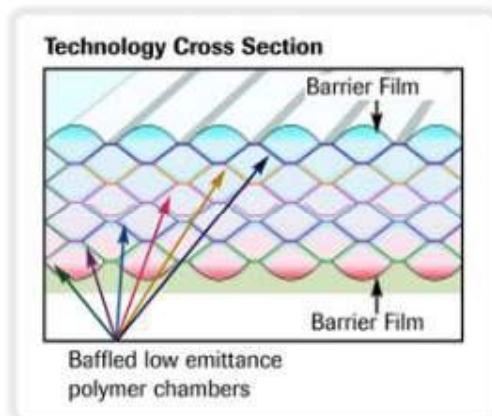
- Aspen's aerogel blanket consists of amorphous silica with extremely low conductivity, incorporated into a flexible form
- In direct fuel consumption testing of two 20' x 21' airbeam tents, the aerogel lined tent consumed 34% less fuel over a continuous 91 hrs period compared to an un-insulated tent:
- Noise suppression added benefit
- New 2-year program starting in FY10 to mature manufacturing technology
- FST POC: Liz Swisher



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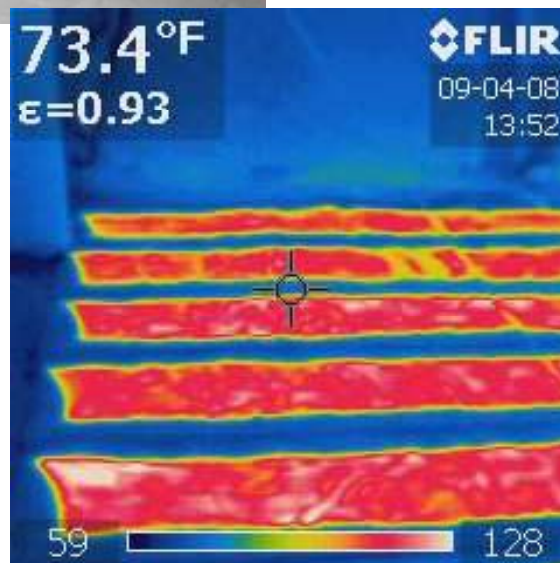
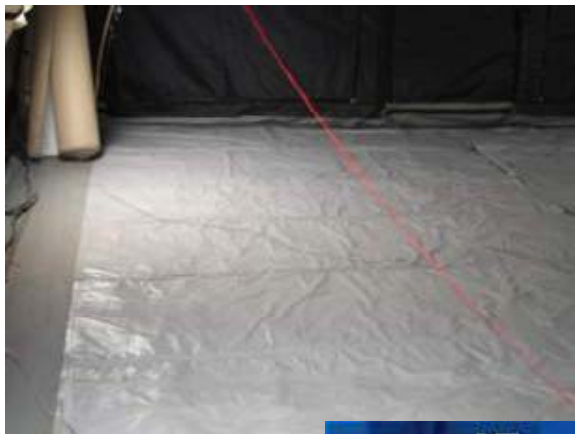
Description: Lightweight, multi-layer honey-comb structure that transports flat, deployed on site using inflation . Commercial product Developed by Fi-Foil, Inc. being adapted for use and evaluation in mobile military shelters.

Capability/Impact: High level of insulation provided in minimal transport weight and cube configuration. Stand-alone panel provides an R-value of 5.



Current Status: 1st generation full-scale prototype systems being designed and Fabricated for testing in TEMPER frame-supported and airbeam tents.

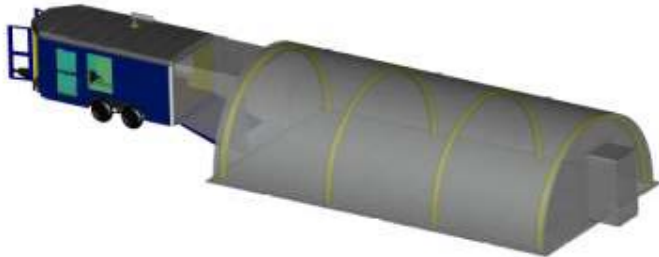
FST POC: Chris Aall



- Exploring radiant heating system for shelters:
 - quality of heat is more consistent throughout the shelter.
 - the majority of heat remains within the first 6 feet of living area.
 - operation is 100% silent.
 - less energy is consumed theoretically, not yet proven in full-scale testing
- Tested first generation prototype from HotMesh, Inc.
- FST POC: Chris Aall



Family of Collective Protection Shelters



- **Develop low cost ColPro for Military and Civil Defense applications**
 - **Mobile Shelter System**
 - **Small Interior Shelter**
 - **Fly Col Pro**

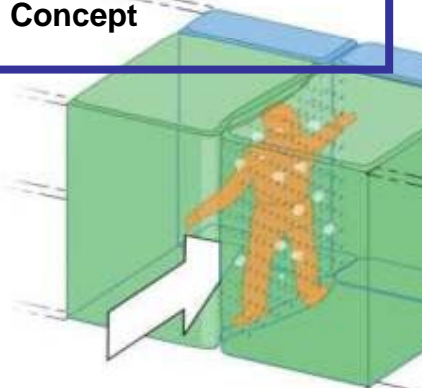
- **Industry Partner: Production Products, Inc.,**

- **Sponsor: Congressionally Directed**

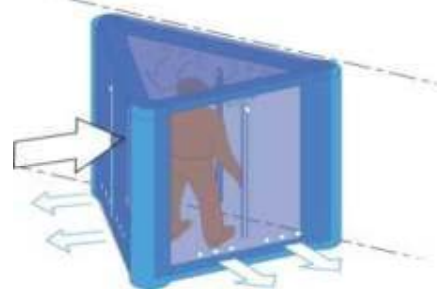
- **FST POC: Tom Larkham**



**"Zero Volume"
Concept**



**Inflatable Airbeam
Concept**



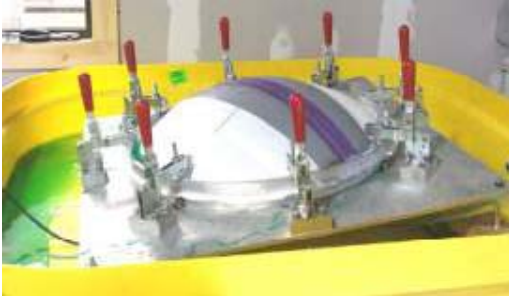
- New airlock technology concepts exploring reactive media and materials while minimizing impact on the target application in regards to stowage and operational volume, power and unique logistical implications.

- Team includes Natick, Tyndall AFB, Technical Products, Inc., Warwick Mills, Inc., Louisiana State University

- Sponsor: DTRA

- FST POCs: Jean Hampel, Kristian Donahue

Hydrostatic

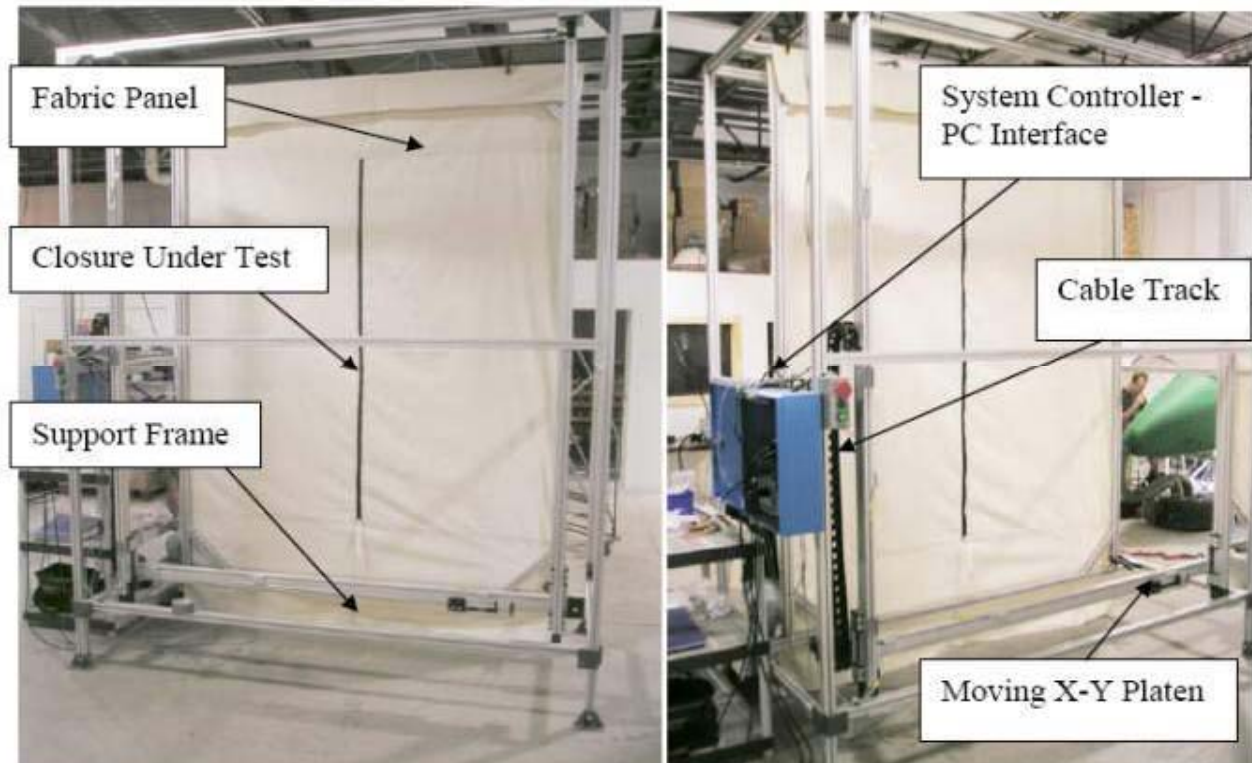


Tensile

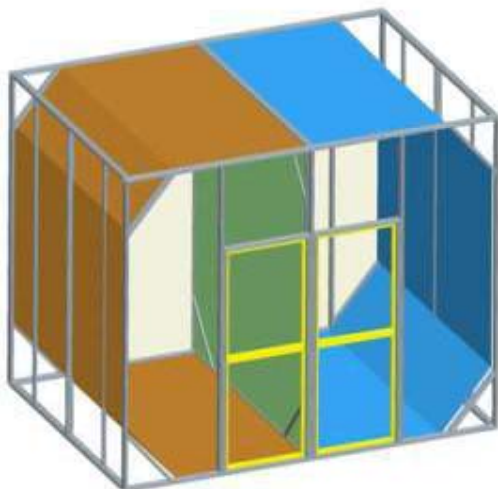


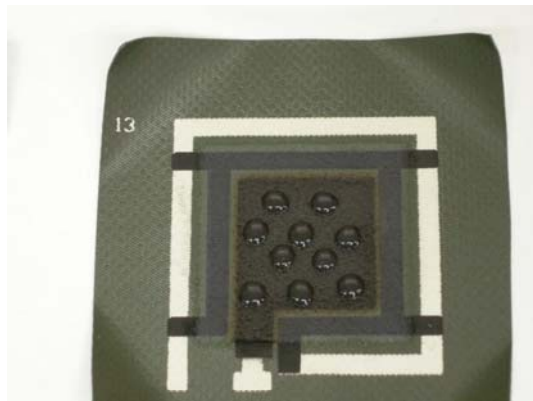
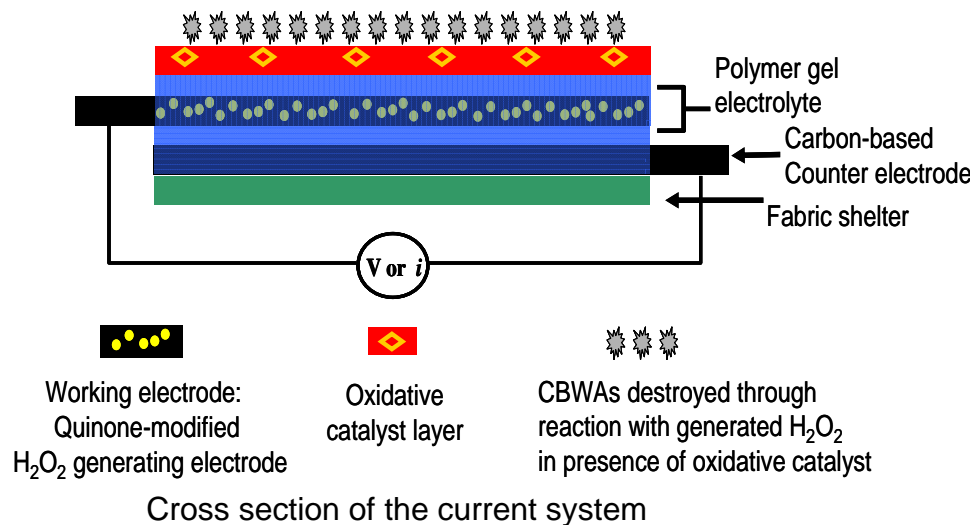
- DTRA program
- Technical Products, Inc. contractor
- FST POC: Kristian Donahue

Durability



Full Scale Prototyping





- **Self- detoxifying polymer-coating for collective protection shelter materials that rapidly and effectively reacts with and destroys chemical and biological warfare agents (CBWAs).**
- **Generation of hydrogen peroxide (H_2O_2) *in-situ* from oxygen and water present in the environment.**
- **Trigger for reaction will be CBWA stand off detector.**
- **Congressionally directed project with Crosslink, Inc.**
- **FST POC: Julia McAdams**



Samples of Material
Before and After
application of CEES

- Improve existing CB textile barrier materials by incorporating visible detection and self-decontamination into the material.
- Industry Partner: Lynntech, Inc.
- Sponsor: SBIR- Phase II
- FST POCs: Julia McAdams, Kristian Donahue



Test Methods for Toxic Industrial and Battlefield Contaminants



- **Develop swatch permeation test methods for the Test and Evaluation of IP and ColPro materials against TICs.**
- **Industry Partner: Battelle**
- **Sponsor: DTRA**
- **FST POC: Julia McAdams**



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- **2 CBD SBIR Phase II's**
 - **Technical Products, Inc**
 - **Agave Biosystems/Gentex, Inc.**
- **Multiple concepts being explored**
 - **Powered and non-powered**
 - **CB protection integrated into kennel**
 - **CB protective “garage” for standard kennels**
- **FST POCs: Julia McAdams, Clinton McAdams**